ing probabilities that the user equipment moves among 3 subareas within 3 time lengths can be calculated.

[0093] For the purpose of conciseness, a user equipment moving among 3 subareas has been taken as an example above to exemplarily describe how to determine the probabilities that the user equipment is located in respective subareas at predetermined time (i.e. respective time lengths as divided, e.g. the above described first time length, second time length and third time length). According to the teaching here, those skilled in the art can similarly calculate the probabilities that respective user equipments move to all subareas and stay for corresponding time lengths within a predetermined time (i.e. the predetermined time discussed in embodiments of the present invention).

[0094] Next, it is possible to determine the types of sensing data that user equipments will collect when moving to subareas. For example, as illustrated in FIG. **4**, the user equipment **105** may collect sensing data with vibration, brightness and temperature types. Based on the predicted trace, the user equipment will access subarea 6 and it has never collected sensing data with the vibration type in the subarea 6. Thus, the user equipment **105** may be selected to collect sensing data with the vibration type in the subarea 6. Similarly, based on the prediction, the user equipment **106** will move to subarea 5, and the sensing data with the vibration, brightness and temperature types that are collected in the subarea 5 and stored in the sensing data agency **101** have not expired. Thus, although the user equipment **106** has the capability to collect sensing data with vibration and brightness types, it cannot collect sensing data with the two types.

[0095] Next, based on the above determined types of sensing data in combination with the obtained probabilities, it is possible to obtain a utility value that can be obtained by a user equipment in a sensing area **102** if the user equipment participates in sensing data collection when moving to the sensing area **102**. For example, it is possible to multiply the obtained probabilities with the number of sensing data types to obtain the utility value.

[0096] The above process for obtaining the utility value of the subarea (i.e. the process of probability calculation and sensing data type determination) may be formulated as below:

$$U_{\alpha}^{L_i}=\int_{t=0}^{\Delta T} p_{Li}^{t}(\alpha)\left|C_{L_i}^{\alpha}-A_{L_i}^{t}\right|dt \quad (7).$$

[0097] In the above formula, $U_{\alpha}^{L_i}$ denotes the utility value that can be obtained when a user equipment α executes sensing data collection in subarea L_i in the cycle ΔT for executing selection of user equipments to participate in sensing data collection. The utility values obtained for respective subareas are summed, that is, it is possible to obtain, via the utility function (4), the utility value that can be obtained if a single user equipment participates in sensing data collection in the entire area **102**, and as described in method **200**, it is possible to select, by sorting or comparing with a predetermined threshold, multiple appropriate user equipments to participate in sensing data collection in a predetermined area at ΔT time.

[0098] FIG. **5** schematically illustrates an entity interaction diagram **500** among a user equipment **106**, a sensing data agency **101** and a service provider **503** for participatory sensing data collection according to embodiments of the present invention. As illustrated in FIG. **5**, the user equipment **106** (may also be respective user equipments as illustrated in FIG. **1**) may comprise, for example, sensors or inductors having the functions of vibration, brightness, temperature, PM 2.5 and camera, etc. As described above, the user equipment **106** at least can select to register with the sensing data agency **101** and send location information to the sensing data agency **101** in real time, or periodically, or based on a request from the sensing data agency **101** so that the sensing data agency **101** can store in a sensing database the identity ID, the sensing capability and the location information of the user equipment, and can predict, based on these data, the probabilities that the user equipment is located in respective subareas (i.e. locations) and the types of data that can be collected so that a participation selection for the user equipment can be made.

[0099] The service provider **503** as a third party may send to a sensing data agency **101** a request for obtaining sensing data, and receive sensing data from the sensing data agency **101**. With these sensing data, the service provider may provide users with, for example, air quality monitoring, traffic or communication monitoring and environment (e.g. noise) monitoring, etc. Alternatively, the sensing data agency **101** may periodically send the collected sensing data to the service provider **503**. Additionally, the sensing data agency **101** may also provide sensing data to the service provider **503** based on the sensing data reaching certain threshold amount.

[0100] FIG. **6** schematically illustrates a block diagram of an apparatus **600** for participatory sensing data collection according to one embodiment of the present invention. As illustrated in FIG. **6**, the apparatus **600** comprises a calculating device **601**, a determining device **602** and an obtaining device **603** configured to execute operations for each of multiple user equipments, and a selecting device **604** configured to execute the selection operation for multiple user equipments. In the apparatus **600**, the calculating device **601** is configured to calculate probabilities that the user equipment is located in respective subareas of a predetermined area at a predetermined time by using historical movement information of the user equipment. The determining device **602** is configured to determine types of sensing data to be collected when the user equipment is located in the respective subareas based on capability information of the user equipment for collecting sensing data. The obtaining device **603** is configured to obtain a utility value of the user equipment associated with sensing data collection within the predetermined area, based on the probabilities calculated for the respective subareas and the determined types of sensing data. The selecting device **604** is configured to select one or more user equipments from the multiple user equipments for collection of participatory sensing data, based on multiple utility values obtained for the multiple user equipments.

[0101] It can be seen that the apparatus **600** may be implemented as or implemented in the sensing data agency **101**, and the respective device included therein respectively execute respective steps as described in method **200** so that appropriate user equipments can be selected for participatory sensing data collection.

[0102] FIG. **7** schematically illustrates a block diagram of an apparatus **700** for participatory sensing data collection according to another embodiment of the present invention. As illustrated in FIG. **7**, the apparatus **700** comprises a first sending device **701**, a second sending device **702**, a receiving device **703** and a collecting device **704**. In the apparatus **700**, the first sending device **701** is configured to send location information of a user equipment so that probabilities that the user equipment is located in respective subareas of a predetermined area at a predetermined time can be calculated by